

1896 and has since sent me specimens. This makes a second authentic station for that species for the State, as I have already recorded it in RHODORA, I, 1899, 93, from a specimen sent me by Mr. W. S. Harris who collected it on the shore of Cobbett's Pond, Windham, on July 23, 1895. The label reads "Scarce. A tall slender bush, with slender clusters of berries." — WALTER DEANE.

### THREE NEW VARIETIES OF ISOETES.

A. A. EATON.

It has been frequently remarked that although the *genus* Isoetes is world-wide in distribution, the *species* are apt to be very circumscribed in range, often confined to a very small area. As new collections are made, however, it is found that old species are often extended in range as might be expected; but it has also been found that species at first considered to be distinct are only conditions in a series, and plants from new localities often fill the gaps. One remarkable instance is in the case of *I. riparia* and *I. saccharata*,<sup>1</sup> whose characters are found in such a series that the question arises if the latter is really more than a variety of the former.

In some instances the plants of a drainage area may be considered as incipient endemic species, evidently from the same original source as those of other water-courses, but presenting constant or slightly varying differences, apparently caused by geologic conditions in some instances.

The vicinity of North Easton, Massachusetts, exhibits a marked instance of this. The soil is mostly a fine gravel, and no clay has been found. During the past season I have found an abundance of Isoetes, but only three familiar ones, namely, *I. Tuckermanni*, and *I. echinospora*, vars. *robusta* and *muricata*. Late in 1902 Mr. R. M. Grey found a small species abundant in the ponds of this vicinity and my search has revealed two others, all of which, although showing some distinctive characters, are best regarded as varieties. The first to be treated is a variety of the very variable *I. saccharata* Engelm. and may appropriately be named for the botanist near whose home it is abundant.

<sup>1</sup> Bot. Gaz. 36: 187-202.

I. SACCHARATA, var. **Amesii**. Trunk 2- 3- 4- or 5-lobed, 4-10 mm. long, 2-5 mm. wide and high; roots very fine: leaves 8-30 cm. long, 1-1.5 mm. in diameter, slender, finely pointed, green and erect when gregarious, spreading when scattered, very narrowly winged to the surface of the soil, quadrangular, the frontal edges elevated, the back flattened; stomata few, bast-bundles none: velum  $\frac{1}{3}$ - $\frac{2}{3}$  indusiate; sporangia 4 mm. long and 3 mm. wide, white or with a few scattered dark brown cells, very turgid from abundance of spores: gynospores 420-600  $\mu$ , averaging 510  $\mu$  long, rather sparsely covered with low, fine, rough granules and thin, short, low walls, often reticulated; androspores 28-32  $\mu$  long, very finely granulated.

Very common in shallow streams and ponds about Easton, Massachusetts, in fine gravel with or without silt, often forming a dense border a few feet to a rod wide, just at the lowest stage of the water, soon disappearing if exposed to the air. It is peculiar in the various lobing of the trunk. Two handfuls obtained by scraping the soil just deep enough to include the plants and then washing out, were found to have an aggregate of 204 individuals, of which 95 were 2-lobed, 94 were 3-lobed, eleven 4-lobed, and four 5-lobed, a much larger percentage of other than two-lobed trunks than has been found before in the United States except in the three 3-lobed species of the Pacific coast. The only other species that shows a considerable tendency toward a plurilobate form is *I. Tuckermanni*, which in some places has 20% with three or more lobes but it is not constant in this trait. Most species may have an occasional plant with a 3-lobed trunk, but our other local ones rarely show a half of one percent so developed. The variety here described differs from *I. saccharata* in its very fine leaves, with few stomata and heterolobing of its trunk.

I have seen what is apparently the same thing from the following localities: Lantern Hill Pond, North Stonington, Connecticut, *C. H. Bissell*, Head of Hambury Cove, Lyme, Connecticut, *Dr. C. B. Graves*, Peeksville, New York, *W. H. Leggett*.

*Isoetes riparia* has been thought to have a place in the New England flora, but after a thorough study of Dr. Engelmann's material I became convinced that it was not found here, or at least that all previous reports were erroneous. I have recently<sup>1</sup> dealt with most of the material so referred, but several collections made about Uxbridge, Massachusetts, between 1831 and 1864 by Robbins, were

<sup>1</sup> Bull. Torr. Bot. Club. 30: 359.

of a different appearance and conclusions regarding them were held back until further investigation.

During the past summer I have been so fortunate as to find an abundance of this form at Watson's Pond in Taunton, in Mulberry Meadow Brook in Easton, and Winneconnet Pond, Norton. Its characters are the same in all respects as in Robbins' plants. Although offering several important differences it is quite closely related to *I. Canadensis* (Engelm.) A. Br. and would best be considered a variety of that species. In recognition of the fact that its first recorded collection in America was by one of the best New England collectors of his day I propose to name it

**I. CANADENSIS, var. Robbinsii.** Trunk bilobed, 8–15 mm. long; leaves, 15–30, 10–38 cm. long, 1–1.5 mm. wide, dark green, very rigidly erect both in water and out, fine-pointed, with stomata and 4 bast-bundles: velum  $\frac{1}{5}$  to  $\frac{1}{3}$  or more indusiate: sporangia covered with brown sclerenchyma cells; gynospores 450–600  $\mu$ , very thickly beset with anastomosing jagged walls (much as in *I. riparia*): androspores 28.7–32.8  $\mu$  in long diameter, rough or slightly papillose or with a few tubercles.

This variety differs from *I. Canadensis* principally in its rigid habit, broader velum, densely sclerenchymatous sporangia, and the dense sculpture of the spores, which strongly resemble those of *I. riparia*.

Uxbridge, Massachusetts, "in rather sandy still part of a small stream, leaves ten, 10 inches high, very finely and sharply pointed" *Robbins*, 1831; Millpond, Uxbridge, 1845 and 1864, *Robbins*; Easton, Mulberry Meadow River, Aug. 16, 1903, *A. A. Eaton*; Norton, Winneconnet Pond, *A. A. E.*; Taunton, Watson's Pond, *A. A. E.*, type. Robbins' specimens were evidently a source of much uncertainty to Dr. Engelmann. One was annotated as follows: "*Tuckermanni?* *riparia?* *Braunii?* apparently *lacustris*, *I. riparia?*" Another is annotated "*riparia major*" and "*lacustris maxima*." They were all finally included in *I. riparia*.

The aspect of this plant is very much like that of *I. Engelmanni*, especially when growing out of water. When submersed the leaves are rigidly erect and look much like those of some junci. The bulb and leaf bases so far as covered by the mud are apt to be pinkish or cream colored. The variety approximates the terrestrial habit fully as much as *I. Engelmanni*, being found on the border of shallow brooks and near the upper limit of water in ponds.

Associated with both of these at their various stations, but occupying an intermediate zone on the shore, *i. e.* lower down than the latter, but higher up than the former, is a large species, often with 80 to 100 reddish leaves from 10 to 15 inches long, with the appearance of *I. Gravesii*, A. A. Eaton or *I. Eatoni*, Dodge, the sporangia being darker than in those, but very flaccid owing to the comparatively few spores they bear. A careful study has convinced me however, that its affinities are really with *I. foveolata*, A. A. Eaton, from which it differs principally in the spores. In that species they have a generally immature appearance, and occasionally there is a spore that is covered with open, thin-walled reticulations. In this, all the spores are well formed and irregularly honeycomb-reticulated, similarly to those of *I. riparia*. This may be known as

I. FOVEOLATA, var. **plenospora**. Trunks bilobed, 1-2 cm. in long diameter, half as wide and one fourth as high; the bulb of sporanges 1-4 cm. in diameter: leaves 30-110, submersed, reddish or olive green, 1.5 mm. in diameter or more, 20-40 cm. long, fleshy, spreading, somewhat flexuous, the emersed light green, erect tortuous or straight, finely pointed, 1 mm. diameter, all with stomata but no bast-bundles: velum  $\frac{1}{4}$ - $\frac{1}{2}$  indusiate, sporangia very thickly covered with rather dark brown cells, the color showing through the very thin "area" on the back of the leaf-base: gynospores rather few to each sporangium, usually somewhat glaucous, 450-600  $\mu$ , average 510  $\mu$  in diameter, covered with irregular, tall, thin, rough, mostly honeycomb-reticulated walls: androsporangia scarce in early season, plentiful in September, the spores 27-33  $\mu$  in diameter, very finely granular or with occasional tubercles.

In aspect this variety appears like an overgrown *I. Tuckermanni*, the habit and color being similar. By spore-characters alone it could not be easily separated from the last, nor indeed from several of our reticulate spored species. The reddish color of the leaves appears always to be present, becoming brownish in dried plants. It is more pronounced in the inner leaves, fading as they grow older. Ames Pond, North Easton, Winneconnet Pond, Norton, and Watson's Pond, Taunton, A. A. Eaton, scattered rather thinly in silt-covered gravel or in mud where emersed for part of the summer. *Types* from these localities collected by A. A. Eaton, 1903.

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